

Appln. No.: 10/092,715
Amendment Dated August 1, 2005
Reply to Office Action of June 1, 2005

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Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1 - 4. (Canceled)

5. (Currently Amended) A method for removing impurities from a starting composition including sucralose; first and second impurities, each of said first and second impurities comprising one or more related halogenated sucrose derivatives; and a first solvent; the method comprising the steps of:

(a) extracting the starting composition with a second solvent at least partially immiscible with the first solvent to transfer the first impurities into said second solvent, thereby converting the starting composition to a partially purified composition comprising the sucralose, the second impurities, and the first solvent;

(b) extracting the partially purified composition with a third solvent at least partially immiscible with the first solvent to transfer the sucralose into said third solvent while retaining the second impurities in said first solvent; and

(c) recovering said sucralose from the third solvent via crystallizing said sucralose;

wherein the first impurities comprise tetrachlorosucrose, and wherein in step (a) at least half of the tetrachlorosucrose is transferred to the second solvent while at least half of the sucralose is retained in the first solvent.

6. (Canceled)

7. (Currently Amended) A method for removing impurities from a starting composition including sucralose; first and second impurities, each of said first and second impurities comprising one or more related halogenated sucrose derivatives; and a first solvent; the method comprising the steps of:

(a) extracting the starting composition with a second solvent at least partially immiscible with the first solvent and including ethyl acetate to transfer the first impurities into said second solvent, thereby converting the starting composition to a

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partially purified composition comprising the sucralose, the second impurities, and the first solvent; and

(b) extracting the partially purified composition with a third solvent at least partially immiscible with the first solvent to transfer the sucralose into said third solvent while retaining the second impurities in said first solvent;

wherein the first impurities comprise tetrachlorosucrose, and wherein in step (a) at least half of the tetrachlorosucrose is transferred to the second solvent while at least half of the sucralose is retained in the first solvent.

8. (Currently Amended) A method for removing impurities from a starting composition including sucralose; first and second impurities, each of said first and second impurities comprising one or more related halogenated sucrose derivatives; and a first solvent; the method comprising the steps of:

(a) extracting the starting composition with a second solvent at least partially immiscible with the first solvent to transfer the first impurities into said second solvent, thereby converting the starting composition to a partially purified composition comprising the sucralose, the second impurities, and the first solvent; and

(b) extracting the partially purified composition with a third solvent at least partially immiscible with the first solvent and including ethyl acetate to transfer the sucralose into said third solvent while retaining the second impurities in said first solvent;

wherein the first impurities comprise tetrachlorosucrose, and wherein in step (a) at least half of the tetrachlorosucrose is transferred to the second solvent while at least half of the sucralose is retained in the first solvent.

9. (Currently Amended) A method for removing impurities from a starting composition including sucralose; first and second impurities, each of said first and second impurities comprising one or more related halogenated sucrose derivatives; and a first solvent; the method comprising the steps of:

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(a) extracting the starting composition with a second solvent at least partially immiscible with the first solvent to transfer the first impurities into said second solvent, thereby converting the starting composition to a partially purified composition comprising the sucralose, the second impurities, and the first solvent; and

(b) extracting the partially purified composition with a third solvent at least partially immiscible with the first solvent to transfer the sucralose into said third solvent while retaining the second impurities in said first solvent, wherein the ratio of said second solvent to said first solvent is about 1:2 to about 1:5;

wherein the first impurities comprise tetrachlorosucrose, and wherein in step (a) at least half of the tetrachlorosucrose is transferred to the second solvent while at least half of the sucralose is retained in the first solvent.

10. (Original) The method of claim 9, wherein said ratio is about 1:3 to about 1:4.

11. (Canceled)

12. (Currently Amended) A method for removing Impurities from a starting composition including sucralose; first and second impurities, each of said first and second impurities comprising one or more related halogenated sucrose derivatives; and a first solvent; the method comprising the steps of:

(a) extracting the composition with a second solvent at least partially immiscible with the first solvent to transfer the first impurities into said second solvent, thereby converting the starting composition to a partially purified composition comprising the sucralose, the second impurities, and the first solvent;

(b) recovering said second solvent containing the transferred first impurities after extraction of said first solvent, backwashing said second solvent with a new portion of said first solvent, and combining at least part of said new portion with the partially purified composition comprising sucralose and impurities in said first solvent; and

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(c) extracting the combined composition resulting from step (b) with a third solvent at least partially immiscible with the first solvent to transfer the sucralose into said third solvent while retaining the second impurities in said first solvent;

wherein the first impurities comprise tetrachlorosucrose, and wherein in step (a) at least half of the tetrachlorosucrose is transferred to the second solvent while at least half of the sucralose is retained in the first solvent.

13. (Currently Amended) A method for removing impurities from a starting composition comprising an aqueous solution of sucralose and first and second impurities, each of said first and second impurities comprising one or more related halogenated sucrose derivatives; the method comprising the steps of:

(a) performing a first liquid extraction of said starting composition comprising an aqueous solution of sucralose and impurities with an at least partially immiscible non-aromatic organic solvent to effect removal of the first impurities into said solvent, thereby converting the starting composition to a partially purified aqueous sucralose composition; and

(b) performing a second liquid extraction of said partially purified aqueous sucralose composition comprising an aqueous solution of sucralose and impurities with an organic solvent to effect the transfer of the sucralose into said organic solvent and the retention of the second impurities in the aqueous phase;

wherein the first impurities comprise tetrachlorosucrose, and wherein in step (a) at least half of the tetrachlorosucrose is transferred into the non-aromatic organic solvent while at least half of the sucralose is retained in the partially purified aqueous sucralose composition, and in step (b) at least half of the sucralose is transferred into the organic solvent of step (b).

14. (Canceled)

15. (Canceled)

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16. (Original) The method of claim 13, further comprising the step of recovering said sucralose.

17. (Original) The method of claim 16, wherein said recovering step comprises crystallizing said sucralose.

18. (Original) The method of claim 13, wherein said solvent utilized in step (a) is ethyl acetate.

19. (Original) The method of claim 13, wherein said solvent utilized in step (b) is ethyl acetate.

20. (Original) The method of claim 13, wherein the ratios of said solvents to the aqueous phase are about 1:2 to about 1:5.

21. (Original) The method of claim 20, wherein said ratios are about 1:3 to about 1:4.

22. (Original) The method of claim 13, wherein said performing steps comprise a method of extraction selected from the group consisting of batch extraction, continuous extraction, and continuous countercurrent extraction.

23. (Currently Amended) A method for removing impurities from a starting composition comprising an aqueous solution of sucralose and first and second impurities, each of said first and second impurities comprising one or more related halogenated sucrose derivatives; the method comprising the steps of:

(a) performing a first liquid extraction of said starting composition comprising an aqueous solution of sucralose and impurities with an at least partially immiscible organic solvent to effect the transfer of the first impurities into said solvent, thereby converting the starting composition to a partially purified aqueous sucralose composition;

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- (b) performing a second liquid extraction of said composition comprising an aqueous solution of sucralose and impurities partially purified composition with an organic solvent to effect the transfer of the sucralose into said solvent and the retention of the second impurities in the aqueous phase;
- (c) extracting the organic solvent containing the transferred first impurities remaining from step (a) with an aqueous solution to effect the transfer of the sucralose present in the organic phase into the aqueous solution; and
- (d) combining the aqueous solution so obtained in step (c) with the aqueous solution recovered in step (a) prior to repeating step (b);

wherein the first impurities comprise tetrachlorosucrose, and wherein in step (a) at least half of the tetrachlorosucrose is transferred to the second solvent while at least half of the sucralose is retained in the partially purified aqueous sucralose composition.

24. (Canceled)

25. (Previously Presented) The method of claim 23, wherein said step (b) effects the transfer of at least half of the sucralose into said solvent of step (b) and the retention of a portion of the impurities in the aqueous phase.

26. (Previously Presented) The method of claim 23, wherein said step (c) effects the transfer of a portion of the sucralose present in the organic phase into the aqueous solution.

27. (Original) The method of claim 23, further comprising the step of recovering said sucralose.

28. (Original) The method of claim 27, wherein said recovering step comprises crystallizing said sucralose.

29. (Original) The method of claim 23, wherein said solvent utilized in step (a) is ethyl acetate.

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30. (Original) The method of claim 23, wherein said solvent utilized in step (b) is ethyl acetate.

31. (Currently Amended) The method of claim 23, wherein ~~said performing each of steps (a), (b), and (c) independently comprises~~ a method of extraction selected from the group consisting of batch extraction, continuous extraction, and continuous countercurrent extraction.

32. (Currently Amended) The method of claim 23, wherein ~~said extracting step (c)~~ comprises a method of extraction selected from the group consisting of batch extraction, continuous extraction, and continuous countercurrent extraction.

33. (Previously Presented) A method for removing tetrachlorosucrose compounds from a solution of sucralose and chlorinated sucrose derivatives in a first solvent comprising extracting the solution of sucralose and other chlorinated sucralose derivatives with an at least partially immiscible non-aromatic second solvent to effect the partition of the tetrachlorosucrose compounds into said second solvent and the retention of the sucralose in said first solvent, wherein said method effects the partition of at least half of the tetrachlorosucrose compounds into said second solvent and the retention of at least half of the sucralose in said first solvent.

34. (Canceled)

35. (Previously Presented) The method of claim 33, wherein said tetrachlorosucrose compounds are selected from the group consisting of 4,1',4',6'-tetrachlorogalactotagatose and 4,6,1',6'-tetrachlorogalactosucrose.

36. (Original) The method of claim 33, wherein said extracting step comprises a method of extraction selected from the group consisting of batch extraction, continuous extraction, and continuous countercurrent extraction.

37. (Currently Amended) A method for removing impurities from a starting composition comprising a solution of sucralose and impurities comprising one or more related halogenated sucrose derivatives more polar than sucralose and one or more related

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halogenated sucrose derivatives less polar than sucralose in a first solvent; the method comprising the steps of:

- (a) performing a first liquid extraction of said starting composition with a second solvent that possesses a lower Hildebrand parameter than said first solvent under conditions that selectively transfer the impurities less polar than sucralose into said second solvent thereby providing to provide a sucralose solution in said first solvent that has an increased ratio of sucralose to impurities less polar than sucralose, thereby converting the starting composition to a partially purified composition comprising sucralose, impurities more polar than sucralose, and the first solvent; and
- (b) performing a second liquid extraction of said partially purified composition with a third solvent that possesses a higher Hildebrand parameter than said first solvent under conditions that selectively transfer the impurities more polar than sucralose into said third solvent, thereby providing a sucralose solution in said first solvent with an increased ratio of sucralose to impurities more polar than sucralose;

wherein the impurities less polar than sucralose comprise tetrachlorosucrose; and wherein in step (a) at least half of the tetrachlorosucrose is transferred to the second solvent while at least half of the sucralose is retained in the first solvent.

38. (Original) The method of claim 37, further comprising the step of recovering said sucralose.

39. (Original) The method of claim 38, wherein said recovering step comprises crystallizing said sucralose.

40. (Original) The method of claim 37, wherein the ratio of said second solvent to said first solvent is about 1:2 to about 1:5.

41. (Original) The method of claim 40, wherein said ratio is about 1:3 to about 1:4.

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42. (Original) The method of claim 37, wherein said performing steps comprise a method of extraction selected from the group consisting of batch extraction, continuous extraction, and continuous countercurrent extraction.

43. (Currently Amended) A method for removing impurities from a starting composition comprising a solution of sucralose and impurities comprising one or more related halogenated sucrose derivatives more polar than sucralose and one or more related halogenated sucrose derivatives less polar than sucralose in a first solvent, the method comprising the steps of:

(a) performing a first liquid extraction of said starting composition with a second solvent that possesses a higher Hildebrand parameter than said first solvent under conditions that selectively transfer at least half of the sucralose into said second solvent while retaining at least half of the impurities less polar than sucralose in the first solvent, thereby providing a sucralose solution in said second solvent that has an increased ratio of sucralose to the impurities less polar than sucralose; and

(b) performing a second liquid extraction of said sucralose solution in said second solvent obtained in the previous step with a third solvent that possesses a higher Hildebrand parameter than said second solvent under conditions that selectively transfer the impurities more polar than sucralose into said third solvent thereby providing a sucralose solution in said second solvent that has an increased ratio of sucralose to the impurities more polar than sucralose.

44. (Original) The method of claim 43, further comprising the step of recovering said sucralose.

45. (Original) The method of claim 44, wherein said recovering step comprises crystallizing said sucralose.

46. (Original) The method of claim 43, wherein the ratio of said second solvent to said first solvent is about 2:1 to about 5:1.

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47. (Original) The method of claim 46, wherein said ratio is about 3:1 to about 4:1.

48. (Original) The method of claim 43, wherein said performing steps comprise a method of extraction selected from the group consisting of batch extraction, continuous extraction, and continuous countercurrent extraction.

49. - 54. (Canceled).